



Market Observation for Danube Navigation: Results for period January-September 2023

Work package:	WP 2 Facilitate IWT and Modal Shift
Deliverable:	D5
Deliverable related No.	D2.2 (Q1-Q3 2023)
Deliverable name:	Market Observation Reports and Inputs to European Market Observation Report (January-September 2023)
Project:	101127323 – 22 – HU – TG – GRANT 3 - Danube
Type of document:	Report
Prepared by	PS
Approved by	
Date:	03.01.2024.

1 Initial state of the Danube transport market in 2023

1.1 The initial state of the main market sectors in Danube shipping at the beginning of the third quarter (Q₃) of 2023 was determined by the overall negative results in terms of cargo traffic volumes in the first half of the year, which was caused primarily by the influence of Russia's full-scale military invasion of Ukraine, which began in February 2022, as well as the emergence of significant risks in the Danube shipping market, including direct threats to the safety of vessel traffic on the Lower Danube.

Accordingly, the volumes of cargo transported in the first half of the year (Q_1+Q_2) 2023 (upstream/downstream in total) were:

- in the cross-border traffic Germany/Austria (DE/AT) –data from the Jochenstein lock: 1.091 thousand tonnes, or 76% of the volume in (Q_1 + Q_2) 2022;
- in the cross-border traffic Hungary/Slovakia (HU/SK) data from the Gabcikovo lock: 2.087 thousand tonnes, or 76.1% of the volume in (Q_1+Q_2) 2022;
- in the cross-border traffic Hungary/Croatia/Serbia (HU/HR/RS) data from the Port of Mohacs: 1.619 thousand tonnes, or 66% of the volume in (Q_1+Q_2) 2022;
- in the Danube Black Sea canal 10.528 thousand tonnes, or 118% of the volume in (Q₁+Q₂) 2022.
- 1.2 During the first half of 2023, the Danube Commission continued its active work to promote the export of Ukrainian products from the agricultural sector of economy, as well as the import of goods necessary for Ukraine, based on the Danube ports of





Ukraine, within the framework of the *Danube Solidarity Lanes EU-Ukraine* initiative adopted in May 2022, in support of solidarity of the European Union with Ukraine, namely in the creation of a special logistics regime at the Danube ports of Ukraine, the Republic of Moldova and Romania, as well as the Danube - Black Sea Canal.

1.3 The cargo turnover of the Danube ports in the first half of 2023 changed in different directions (Table 1.1).

Table 1.1

Ports (thousand tonnes)	2019	2020	2021	2022	2022 Q1+Q2	2023 Q1+Q2
Germany	3.274	3.511	2.999	2.410	1.370	1.047
Austria	6.452	6.050	6.356	5.363	3.252	2.506
Slovakia	1.664	1.553	1.846	1.934	952*	810*
Hungary	6.064	6.742	5.715	4.063	1.356	1.746
Croatia	814	948	697	582	338,8	186,4
Serbia	9.735	8.164	13.610	12.023	6.366	6.628
Bulgaria	5.385	5.431	7.111	7.104	3.751	4.004
Romania	28.474	27.307	28.457	24.355	12.976	13.053
Republic of Moldova	1.299	1.185	1.819	2.144	1.140	1.238
Ukraine	5.629	4.055	5.505	16.505	5.102	15.146

Cargo turnover of the Danube ports in period 2019-2023

*Ports of Bratislava and Komarno

- 1.3.1 Significant increase in cargo turnover of the Danube ports of Ukraine during the first half of the year is a logical consequence of the decisive measures and significant actions, taken by the Government of Ukraine with the support of the European Union and the Danube Commission, to intensify the export of agricultural products through the ports using sea vessels (through the Sulina Canal and Kiliya arm), as well as large convoys to the port of Constanta through the Danube-Black Sea Canal with subsequent reloading onto sea vessels.
- 1.3.2 On the night of July 24, and then in August and September, Russia attacked the Ukrainian port infrastructure on the Danube River with drones; and, as a result of this attack, siloes, tanks, warehouses, administrative buildings were damaged, and significant volume of grain cargo was destroyed. Despite the consequences of these attacks and their constant threat, over the 10 months of 2023, Ukrainian ports increased the volume of cargo turnover by 2.2 times compared to the same period in 2022.
- 1.4 The dynamics of the freight transport market during the period under review were also affected by a drop in demand for steel, rising energy prices, including ship





bunker fuel, and a decrease in operating vessel drafts during the summer low water period that began in the third quarter (Q_3) of 2023.

1.5 In the passenger market, sporadic (and then rapidly increasing) voyages on the main Upper Danube cruise lines were launched in March 2023; in April, May and June there was a further increase in voyages and the number of passengers transported. In total, 209.9 thousand passengers were transported on the Upper Danube cruises in (Q1+Q2) 2023, or 125% of the volume in 2022.

A different situation occurred on cruises in the direction of the Danube Delta: the number of passengers on these voyages was only 17.03 thousand in the first half of the year, which is 51% of the number in the same period in 2022.

2 Navigation Conditions on the Danube in 2023

2.1 Navigation conditions during the nine months of 2023

At the beginning of 2023, snow accumulations in the mountainous areas of the Danube basin were estimated to be below the multi-year average, but exceeded those at the beginning of 2022. Under these conditions, the maximum water levels at the formation of the spring flood wave characteristic of the Danube River were also close to the long-term averages.

In **January** 2023, water levels on the <u>Upper Danube</u> (Pfelling gauging station, Fig. 1) fluctuated between 30 and 70 cm above the mean water level (*MWL*). On the <u>Middle Danube</u> (Gauging station Vigado, Budapest, Fig. 2), water levels at the beginning of the first ten-day period were 30-80 cm below MWL; subsequently, two consecutive increases in water levels within 40-60 cm above the MWL were observed during the month, followed by a drop below the MWL by the end of the month. On the <u>Lower Danube</u> in January, water levels were 2.5-3.2 m above the MWL in the first decade, then 2.6-4.2 m higher until the end of the month.

In the middle of the first 10-day period of **February**, the <u>Upper Danube</u> experienced a short-term rise in water levels by 50-60 cm above MWL, followed by a drop below MWL until the end of the month. On the <u>Middle Danube</u>, water levels during the month were consistently below the MWL with occasional exceedances of 35-45 cm at the beginning of the third decade. On the <u>Lower Danube</u>, water levels were 2.5-3.2 m above the MWL throughout the month.

During the second 10-day period of **March**, water levels on the <u>Upper Danube</u> exceeded MWL by 70-80 cm, then fluctuated between 60-90 cm below MWL until the end of the month. On the <u>Middle Danube</u>, water levels were consistently 40-80 cm below the MWL during the month. On the <u>Lower Danube</u>, water levels were 2.5-3.3 m above the MWL during the first 10-day period, with subsequent exceedance of the MWL by 3.5-4.0 m.

In **April**, water levels on the <u>Upper Danube</u> fluctuated within the range of the MWL, with occasional exceedance at the beginning of the first 10-day period, and a sharp increase above the MWL from the middle of the second 10-day period. On the <u>Middle</u> <u>Danube</u>, water levels fluctuated near MWL during the first 10-day period; from the middle of the second 10-day period; a sharp increase with an amplitude value of 1.6-1.7





m above the MWL was observed, followed by a decrease to the MWL level by the end of the month. On the <u>Lower Danube</u>, water levels throughout the month were 3.2-4.2 m above MWL.

In **May**, water levels on the <u>Upper Danube</u> fluctuated in the range above the MWL, with occasional maximum exceedance by 1.5-1.8 m in the second 10-day period; by the end of the third 10-day period, a decline to the MWL level began. On the <u>Middle Danube</u>, levels remained consistently above the MWL with occasional maximum exceedance of 2.0-2.4 m during the second ten-day period; by the end of the third 10-day period, a decline to the <u>Lower Danube</u>, water levels were 3.5-4.2 m above MWL throughout the month.

In **June**, the <u>Upper Danube</u> began a successive decline in water levels and from the middle of the second 10-day period, levels dropped below the low navigable water level (LNWL) multi-year average, with subsequent fluctuations near this value until the end of the month. On the <u>Middle Danube</u>, levels during the first and partly the second 10-day period remained fluctuating close to the MWL; from the middle of the second 10-day period, a stable drop below the MWL by 0.8 0.9 m began. On the <u>Lower Danube</u>, water levels during the first two 10-day periods remained at a level above or close to the MWL; by the end of the third 10-day period, a sharp drop in levels began.

In **July**, on the <u>Upper Danube</u>, levels fluctuated in the range of LNWL values; at the end of the third decade, levels began to rise from the LNWL values due to precipitation. On the <u>Middle Danube</u>, levels throughout the month were significantly lower (on average by 60-70 cm) the MWL value. On the <u>Lower Danube</u>, water levels fluctuated throughout the month at levels below MWL values by 1.3 – 2.2 m.

In **August**, on the <u>Upper Danube</u>, in the first ten days there was a sharp rise in levels to MWL values, exceeding it by 60-90 cm, after which they began to decrease again; at the end of the third decade, a sharp rise in levels above the MWL was repeated. On the <u>Middle Danube</u>, in the middle of the first decade, there was a sharp rise in levels to MWL values, with occasional excesses of 2.2 -2.5 m, after which the levels began to decrease to a zone below MWL. On the <u>Lower Danube</u>, water levels fluctuated throughout the month within the range of MWL values, with their occasional excess in the second decade by 30-70 cm.

In **September**, on the <u>Upper Danube</u>, at the beginning of the first 10-day period, there was a sharp rise in levels above the MWL with occasional excesses of 2.0-2.5 m, after which they began to sharply decrease to the zone of LNWL values. On the <u>Middle Danube</u>, at the beginning of the first decade, there was a sharp rise in levels above the MWL with occasional excesses of 2.5-2.8 m, after which they began to sharply decrease to the zone below the MWL by 60-80 cm. At the <u>Lower Danube</u>, water levels fluctuated throughout the month in the zone below the MWL values by 1.4 - 2.1 m.





(a) Pfelling, Germany (2306 km)



I. II. III. IV. V. VI. VII. VIII. IX. X. XI. XII.

(b)

Pfelling, Germany (2306 km)



Fig. 1. Average daily (a) and absolute (b) values of water levels for the Pfelling water gauge, in cm





(a) Budapest, Hungary (1647 km)



(b)

Budapest, Hungary (1647 km)



Fig. 2. Average daily (a) and absolute (b) values of water levels for the Budapest Vigado gauging station, in cm





2.2 Water Flow and Operating Draughts of Vessels

The absence of freezing of the river and ice phenomena ensured continuous navigation in the first quarter of 2023. Stable water flow in the first half of the year (Q_1+Q_2) 2023 was ensured, which made it possible to load ships to the maximum draught when flowing upstream at levels of 2.5-2.7 m (Table 2.1).

Table 2.1

Month	Loaded, going upstream (cm)	Loaded, going downstream (cm)
January	250 (230*)	220/230 (200/210*)
February	270 (230)	230 (200/210)
March	270 (230/250)	230/240 (210/220)
April	270 (250)	230/240 (220/230)
Мау	270 (250)	230/240 (230)
June	250 (220)	220 (210)
July	240/250 (190/180)	220/230 (200)
August	230/240 (190/180)	200/210 (190)
September	220/230 (190/180)	190/200 (180/190)
October	210/200 (190/200)	170/180 (190/200)

Draught of cargo vessels during navigation in 2023

* Indicators for the corresponding period of 2022 are given for comparison

In the third quarter (Q_3) of 2023, the operating draughts of ships on average decreased significantly. At the same time, on the Lower Danube in the Izmail - Constanta section, draught remained at a level of about 250 cm.

3 Dynamics of the Danube Shipping Market for 9 months of 2023

3.1 Passenger transport

Passenger transportation on cruise ships with cabins, which has demonstrated a significant drop on the Upper Danube in 2020-2021, over 9 months $(Q_1+Q_2+Q_3)$ of 2023 showed a significant increase (Table 3.1).





(in thousands)								
Lines	2019	2020	2021	2022	2022 Q1+Q2+Q3	2023 $Q_1+Q_2+Q_3$		
Upper Danube	720,8	56,1	149,1	469,3	363,7	443,6		
To Danube Delta	135	5,15	34,1	74	66,0	27,5		

Dynamics of passenger transportation on cruise ships in 2023 (in thousands)*

* Calculations, done by the Secretariat of the Danube Commission, based on the data from Gabcikovo and Mohács (taking into account both upstream and downstream voyages)

The decrease in passenger traffic in the direction of the Danube Delta is explained primarily by problems with the safety of navigation on the Lower Danube.

3.2 Cargo transport

To analyze the dynamics of the Danube cargo transport market, the volumes and its main elements for 9 months of 2023 by nomenclature are presented in comparison with $(Q_1+Q_2+Q_3)$ 2022. At the same time, a number of specific features can be noted for individual sectors:

- 3.2.1 In cross-border traffic Germany/Austria (DE/AT) for 9 months $(Q_1+Q_2+Q_3)$ of 2023, the total transported (upstream/downstream in the amount of 1.663 thousand tonnes, which is 95% of the volume for the same period 2022).
- 3.2.2 In the cross-border traffic Hungary/Slovakia (HU/SK), the total volume of traffic amounted to 3.137 thousand tonnes (Fig. 3), which is 91% of the volume for the same period in 2022.

The main volume, as in the same period $(Q_1+Q_2+Q_3)$ of 2022, was provided by upstream transportation of food products, iron ore raw materials, grains, as well as downstream transportation of chemical industry products (fertilizers) and petroleum products (Tables 3.2, 3.3, Fig. 4).

At the same time, it should be noted that there was a drop in absolute value, compared to the same period (Q1+Q2+Q3) of 2022, in the volume of transportation of food products upstream and an increase in the volume of transportation of petroleum products downstream.





Downstream

Gabčíkovo - 2023 Q1+Q2+Q3 (tonnes)



Fig. 3. Cargo transport volume upstream/downstream the Danube through the GABČIKOVO lock by years, in tonnes

Table 3.2

(by nomenclature)								
Year, thousand tonnes	2019	2020	2021	2022	2022	2023		
Commodity group					$Q_1 + Q_2 + Q_3$	$Q_1 + Q_2 + Q_3$		
Food products and animal feed	1.774 48%*	1.321	879	783	663	420		
Iron ore raw materials	841 22%	948	969	735	588	614		
Grain	271 7,3%	352	394	416	321.7	296		
Metal products	340 9,2%	117	71	101	93	41,1		
Petroleum products	241 6,5%	212	86,7	92,1	86,9	38,7		
Organic and synthetic fertilizers	91,5 2,5%	75,2	132,8	74,5	64	39,8		

Cargo volumes in upstream HU/SK cross-border transport (by nomenclature)

* From the volume of goods transported downstream





Cargo volumes in downstream HU/SK cross-border transport (by nomenclature)

Year, thousand tonnes	2019	2020	2021	2022	2022	2023
Commodity						
group					$Q_1+Q_2+Q_3$	$Q_1+Q_2+Q_3$
Organic and synthetic fertilizers	535* 25%	505	464,5	444,9	378,9	330,3
Petroleum products	671,3 31,4%	578	870	642	423,8	500,3
Metal products	380,4 17,8%	96,5	140	173	132	133,7

* From the volume of goods transported downstream



Fig. 4. Cargo transport volume upstream/downstream the Danube through the GABČIKOVO lock by groups of goods, in tonnes





<u>Features of the transport market on this section of the Danube:</u>

- transportation by pushed convoys amounted to 50% of the total volume of cargo (in 2022 - 49%) with a long-term ratio from 52% to 59.4%;
- relative stabilization of the volume of downstream transportation of iron ore raw materials in 2021/2022/2023: 148/196.4/208 thousand tonnes, respectively.
- 3.2.3 <u>In the cross-border traffic Hungary/Croatia/Serbia (HU/HR/RS)</u>, the total volume of traffic amounted to 2.641 thousand tonnes (Fig. 5), which is 84% of the volume for the same period in 2022.

The main drop, compared to the same period in 2022, was caused by a decrease in transportation of the main market-forming volumes: coal–upstream (virtually not carried out), fertilizers – upstream, and grain cargo – downstream (Tables 3.4, 3.5, Fig. 6).

Features of the transport market on this section of the Danube

- downstream transportation of grain cargo, which showed a 3.2-fold increase in the same period of 2020 and 2021 compared to $(Q_1+Q_2+Q_3)$ 2019, maintained the low levels achieved in 2022;
- volumes of downstream transportation of food cargo and petroleum products significantly exceeded the figures for 2022 and correspond to the volumes achieved in 2019-2021.



Mohács - 2023 Q1+Q2+Q3 (tonnes)

Fig. 5. Cargo transport volume upstream/downstream the Danube through MOHACS by years, in tonnes





Cargo volumes in upstream HU/HR/RS cross-border transport	
(by nomenclature)	

Year, thousand tonnes	2019	2020	2021	2022	2022	2023
Commodity group					$Q_1 + Q_2 + Q_3$	$Q_1 + Q_2 + Q_3$
Iron ore raw materials	1.247 37,6%	954	991	741	596	542,4
Coal (coke)	479 14,4%	323	281	200	179,4	0
Fertilizers	392 11,8%	436	385	255,6	186,9	107,3
Petroleum products	109 3,2%	106	117	252	172,3	115,7
Metal products	270 8,1%	243	249	205	160	78,2

Mohács - 2023



Fig. 6. Cargo transport volume upstream/downstream the Danube through the MOHACS by groups of goods, in tonnes





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Year, thousand tonnes	2019	2020	2021	2022	2022	2023	
Commodity group					Q1+Q2+ Q3	$Q_1+Q_2 +Q_3$	
Grain	479 21,1%	1.471	1.002	238,9	220,2	192,4	
Petroleum products	428 18,9%	528	591	322,3	254,4	335,2	
Metal products	316 13,9%	295	254	310	202,5	295,6	
Food products and animal feed	203 9%	520	218,5	65	48,5	203,7	
Fertilizers	272 12%	364	316	315,5	269,2	168,2	

Cargo volumes in downstream HU/HR/RS cross-border transport (by nomenclature)

3.2.4 <u>The volume of traffic along the Danube - Black Sea Canal</u> for 9 months of 2023 amounted to 17.102 thousand tonnes, which is 133% of the volume for the same period in 2022 (Table 3.6, Fig. 7).

Table 3.6

Volumes of cargo transportation along the Canal Danube- Black Sea

Year	2019	2020	2021	2022	2022	2023
Million tonnes						
					$Q_1+Q_2+Q_3$	$Q_1+Q_2 + Q_3$
Total cargo volumes	16,74	16,51	17,29	17,27	12,88	17,10
International transport	8,89	10,60	9,11	12,0	8,49	13,67
Domestic transport	7,85	5,91	8,18	5,27	4,39	3,43







Cernavodă-Constanța

Fig. 7. Cargo transport volume upstream/downstream through the CERNAVODA Canal by local and international transport, per months, in tonnes

The volume of international traffic through the canal for 9 months of 2023 amounted to 161% of the volume for the same period in 2022, while domestic (cabotage) traffic amounted to 78% of the volume in 2022.

3.2.5 Port cargo turnover for 9 months of 2023

The state of the market in the third (Q_3) quarter of 2023 determined the multidirectional change in cargo turnover of the Danube ports as a whole for ($Q_1+Q_2+Q_3$) 2023 compared to the same period in 2019-2021. (Table 3.7).





Ports	2019	2020	2021	2022	2022	2023
(thousand					$Q_1+Q_2+Q_3$	$Q_1+Q_2+Q_3$
tonnesj						
Germany	3.274	3.511	2.999	2.410	1.859	1.712
Austria	6.452	6.050	6.356	5.363	4.239	2.766
Slovakia	1.664	1.553	1.846	1.934	1.455	1.214*
Hungary	6.064	6.742	5.715	4.063	3.232	2.748
Croatia	814	948	697	582	456,7	273,3**
Serbia	9.735	8.164	13.610	12.023	8.788	9.330
Bulgaria	5.385	5.431	7.111	7.104	5.242	5.518***
Romania	28.474	27.307	28.457	24.355	18.346	21.097
Republic of Moldova	1.299	1.185	1.819	2.144	1.610	1.954***
Ukraine	5.629	4.055	5.505	16.505	10.646	24.705***

Cargo turnover of ports of the Danube countries in 2019-2023

* Ports of Bratislava and Komarno

** Data from all ports in Croatia (<u>www.dzs.hr</u>)

*** Data obtained respectively from the Ukrainian Sea Port Authority, and the maritime administrations of Bulgaria and the Republic of Moldova

Features of port operation for 9 months of 2023:

The largest increase in cargo turnover in the Danube ports of Ukraine (Table 3.8) ensured an increase in the volume of exports of products from the agricultural sector of the economy, while the bulk of exports was grain cargo (Table 3.9).

Table 3.8

Cargo turnover of the Danube ports of Ukraine in 2023 (thousand tonnes)*

Port/Period	Izmail	Reni	Ust-Dunaisk
$(Q_1+Q_2+Q_3) 2023$	15.299	7.986	1.419

* Data provided by Ukrainian Sea Port Authority





Cargo turnover of the Danube ports of Ukraine in exports in 2023 (thousand tonnes)

Port/Period (Q1+Q2+Q3) 2023	Izmail	Reni	Ust-Dunaisk
Grain	7.182,75	4.314,21	713,06
Other dry bulk cargo	1.717,29	1.276,45	454,23
Oil (liquid bulk cargo)	1.302,00	840,52	0

For all main components of cargo turnover at Ukrainian ports, the volumes were significantly higher than the corresponding values in the same period in 2022 (Table 3.10).

Table 3.10

Main components of cargo turnover of Ukrainian ports in 2023 (thousand tonnes)

Period/Year	Grain	Other dry bulk cargo	Oil (liquid bulk cargo)
2022	3.507,88	2.217,92	707,78
2023	12.210,02	3.447,97	2.142,52
%	348,1	155,5	302,7

The cargo turnover of the Port of Constanta for river transport amounted to 15,540 thousand tonnes, or 136.8% of the volume for 9 months of 2023, while the cargo turnover in international transport amounted to 13,077 thousand tonnes, or 84% of the total volume.





4 Conclusions

- 4.1 During the period under review $(Q_1+Q_2+Q_3)$ of 2023, the impact of full-scale Russian aggression in Ukraine had a significant impact on the freight transport market and caused a drop in total volumes and a redistribution of the ratios of the main market sectors.
- 4.2 Economic risks in the Danube shipping market were accompanied by real security threats to shipping on the Lower Danube, which was also reflected in the decline of the passenger transport market towards the Danube Delta.
- 4.3 The Danube Commission continues to work on special coordination activities in order to more actively use the transport potential of Danube shipping in transport from the Danube ports of Ukraine within the framework of the Danube Solidarity Lanes EU Ukraine initiative adopted in May 2022, as well as to ensure all safety measures for navigation.
- 4.4 The ongoing activities and actual actions taken by the Danube Commission to stabilize the market and ensure the safety of navigation on the Danube are coordinated with the European Commission.